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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/788,657	02/27/2004	Lei Shao	042390.P16330X	3606
45209	7590	02/20/2008	EXAMINER	
INTEL/BLAKELY 1279 OAKMEAD PARKWAY SUNNYVALE, CA 94085-4040			MURPHY, RHONDA L	
ART UNIT		PAPER NUMBER		
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No.	Applicant(s)
	10/788,657	SHAO ET AL.
	Examiner	Art Unit
	Rhonda Murphy	2616

— The MAILING DATE of this communication appears on the cover sheet with the correspondence address —  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 31 December 2007.  
 2a) This action is FINAL.      2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 23-29 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 23-29 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on 27 February 2004 is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) <input type="checkbox"/> Notice of References Cited (PTO-892)	4) <input type="checkbox"/> Interview Summary (PTO-413)
2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	Paper No(s)/Mail Date. _____
3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____	5) <input type="checkbox"/> Notice of Informal Patent Application
	6) <input type="checkbox"/> Other: _____

## DETAILED ACTION

### ***Response to Amendment***

1. This communication is responsive to the amendment filed on 12/31/07.

Accordingly, claims 1-22 have been canceled and claims 23-29 are currently pending in this application.

### ***Response to Arguments***

1. Applicant's arguments with respect to claims 23-29 have been considered but are moot in view of the new ground(s) of rejection.

### ***Double Patenting***

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Omum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

3. Claim 23 is provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 10/789,387. Although the conflicting claims are not identical, they are not patentably distinct from each other because the instant application recites "an article of manufacture comprising a storage medium having instructions stored thereon", whereas the copending application recites a method. It would have been obvious to one skilled in the art to provide a storage medium executing the method described in the copending application, for the purpose of executing the instructions for performing the specified functions.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

#### ***Claim Rejections - 35 USC § 101***

4. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 23-29 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Claims 23-29 recite "an article of manufacture comprising a storage medium". The applicant describes on page 20, line 20 to page 21, line 1, the storage medium being a carrier wave. It is non-statutory when nonfunctional descriptive material is recorded on some computer-readable medium, in a computer or on an electromagnetic carrier signal.

***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 26 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

7. In claim 26, line 4, the limitation recites "k=1...L. It is unclear how k is applied, since no equation using "k" has been provided.

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claims 23, 24 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. ("A Space-Frequency Transmitter Diversity Technique for OFDM systems", Globecom 2000, IEEE Global Telecommunications Conference; November 27, 2000) in view of Hottinen et al. (US 2005/0078761 A1).

**Regarding claim 23**, Lee teaches an article of manufacture comprising a storage medium having instructions stored thereon that, if executed, result in: a number M of omnidirectional antennas (Tx1 and TX2 in fig. 2); and a diversity agent, to receive content for transmission via a multicarrier wireless communication channel (X(m) in fig. 2. It would be inherent to have a receiver to receive the symbol), and to generate a rate-one (equation (1) on pg. 1474), space-frequency code matrix (matrix G2 on pg. 1474) from the received content for transmission on the multicarrier wireless communication channel from at least a subset of the M omnidirectional antennas antennae (Tx1 and Tx2 in fig. 2).

Lee fails to explicitly disclose three or more transmit antennae.

However, Hottinen discloses three or more transmit antennae (Fig. 3; TX1, TX2...TXnt).

In view of this, it would have been obvious to one skilled in the art to include three or more transmit antennae, for the purpose of achieving channel diversity in the system (page 1, paragraph 2).

**Regarding claim 24**, Lee teaches an article of manufacture as claimed in claim 23, wherein the received content is a vector of input symbols of size  $N_c \times 1$  (pg. 1474, right column, first paragraph), wherein  $N_c$  is the number of subcarriers of the multicarrier wireless communication channel (equation (1),  $X_0(n)-X_1(n)\dots X_{n-2}(n)-X_{n-1}(n)$  and  $X_1(n)\dots X_{n-2}(n)$  are interpreted to be corresponding to the number of subcarriers).

**Regarding claim 29**, Lee teaches an article of manufacture as claimed in claim 23, the space-frequency matrix provides  $M N L$  channel diversity (pg. 1477, section V in Lee. Two-branch SF-OFDM transmitter diversity), while preserving a code rate of 1 for any number of transmit antenna(s)  $M$ , receive antenna(s)  $N$  and channel tap(s)  $L$  (pg. 1477, section V. Unity coding rate is interpreted as a code rate of 1).

11. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee et al. and Hottinen as applied to claim 24 above, and further in view of Wei (US 5,559,561).

**Regarding claim 25**, Lee teaches an article of manufacture as claimed in claim 24, the diversity agent further comprising: dividing the vector of input symbols (pg. 1474, right column, first paragraph. Data symbol vector  $X(n)$  ) into a number  $G$  of groups to generate subgroups (equation (1),  $X(n)$  divided into  $X_1(n)$  and  $X_2(n)$  ).

Lee fails to explicitly teach multiplying at least a subset of the subgroups by a constellation rotation precoder to produce a number  $G$  of pre-coded vectors (VQ).

However, Wei teaches using a Tomlinson precoder (precoder 17 in fig. 1) which outputs a sequence of values (col. 3 lines 51-54, the sequence is interpreted to be a vector). It is well known in the art that a Tomlinson precoder is a constellation precoder.

Therefore, given the combined teachings of Lee and Wei, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the precoder of Wei into the system of Lee, in order to compensate in advance for forced intersymbol interference (col. 3 lines 47-50).

**Regarding claim 26**, Lee teaches an article of manufacture as claimed in claim 25, the diversity agent further comprising: dividing each of the pre-coded vectors into a number of  $LM \times 1$  subvectors (fig. 2 in Lee, the symbol vector  $X(m)$  is divided into  $X1(n)$  and  $X2(n)$  after encoding).

Lee fails to teach creating an  $M \times M$  diagonal matrix, where  $k=1 \dots L$  from the subvectors.

However, Hottinen teaches creating a diagonal transmission code matrix from transmit diversity code matrices (paragraph 0034). The code matrices  $X1$  and  $X2$  are interpreted to be subvectors.

Therefore, given the teaches teachings of Lee and Wei with Hottinen, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the diagonal code matrix of Hottinen into the method of Lee and Wei, in order to increase performance and symbol rate in a wireless mobile system (abstract).

**Regarding claim 27**, Lee teaches an article of manufacture as claimed in claim 26, wherein interleaving the  $L$  submatrices (pg. 1474, right column, second paragraph.  $Xe(n)$  and  $Xo(n)$  are interpreted to be the submatrices) from the  $G$  groups (pg. 1474, right column, first and second paragraphs.  $X1(n)$  and  $X2(n)$  are interpreted to be the

groups. Furthermore,  $X_e(n)$  and  $X_o(n)$  are component vectors of  $X(n)$  to generate an  $M \times N_c$  space-frequency matrix (matrix G2 on pg. t474).

**Regarding claim 28**, Lee teaches an article of manufacture as claimed in claim 27, wherein the space-frequency matrix provides  $M \times N \times L$  channel diversity (pg. 1477, section V. Two-branch SF-OFDM transmitter diversity), while preserving a code rate of 1 for an number of transmit antenna(s)  $M$ , receive antenna(s)  $N$  and channel tap(s)  $L$  (pg. 1477, section V. Unity coding rate is interpreted as a code rate of 1).

### **Conclusion**

1. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rhonda Murphy whose telephone number is (571) 272-3185. The examiner can normally be reached on Monday - Friday 9:00 - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Huy Vu can be reached on (571) 272-3155. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Rhonda Murphy  
Examiner  
Art Unit 2616

RM

  
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